Resonance®
Educating for better tomorrow
Distance Learning Programmes Division (DLPD)

RANK BOOSTER™

1000+ Performance Boosters..

for **JEE (ADVANCED)**

Best problems to revise, strengthen & clarify the concepts.

- Topic Wise 1000+ Questions.
- 6 Part Syllabus Test.
- 3 Full Syllabus Test.
- Covers Class XI & Class XII Syllabus.
- Complete Solutions.

MATHEMATICS

Contents

SECTION-I (TOPIC WISE PROBLEMS)

S.No.	Topic	Page No.
1.	STRAIGHT LINE	001 - 007
2.	CIRCLE	008 - 014
3.	PARABOLA	015 - 020
4.	ELLIPSE	021 - 028
5.	HYPERBOLA	029 - 036
6.	FUNCTION	037 - 046
7.	LIMIT OF FUNCTION	047 - 052
8.	CONTINUITY & DERIVABILITY	053 - 059
9.	METHOD OF DIFFERENTIATION	060 - 063
10.	APPLICATION OF DERIVATIVES	064 - 072
11.	INDEFINITE INTEGRAL	073 - 078
12.	DEFINITE INTEGRAL	079 - 087
13.	AREA UNDER CURVE	088 - 091
14.	DIFFERENTIAL EQUATION	092 - 097
15.	BASICS	098 - 103
16.	QUADRATIC EQUATION	104 - 109
17.	SEQUENCE & SERIES	110- 114
18.	BINOMIAL THEOREM	115 - 119
19.	PERMUTATION & COMBINATION	120 - 125
20.	PROBABILITY	126 - 133
21.	MATRICES & DETERMINANTS	134 - 140
22.	COMPLEX NUMBER	141 - 147
23.	VECTORS	148 - 154
24.	THREE DIMENSIONAL GEOMETRY	155 - 159
25.	TRIGONOMETRIC IDENTITIES & EQUATION	160 - 164
26.	SOLUTION OF TRIANGLES & HEIGHT DISTANCE	165 - 170
27.	INVERSE TRIGONOMETRIC FUNCTION	171 - 176

Contents

SECTION-II (PRACTICE TEST PAPERS)

Particular	Page No.
6 PTs (PART SYLLABUS TEST)	
PT-01 (COORDINATE GEOMETRY & 2-D _CLASS XI)	177 - 182
PT-02 (ALGEBRA-1_CLASS XI)	183 - 187
PT-03 (TRIGONOMETRY_CLASS XI)	188 - 193
PT-04 (DIFFERENTIAL CALCULUS_CLASS XII)	194 - 199
PT-05 (INTEGRAL CALCULUS_CLASS XII)	200 - 205
PT-06 (ALGEBRA-2 & GEOMETRY-3-D_CLASS XII)	206 - 211
3 FST (FULL SYLLABUS SUBJECT TEST)	
FST-01 (XI SYLLABUS)	212 - 215
FST-02 (XII SYLLABUS)	216 - 219
FST-03 (XI + XII SYLLABUS)	220 - 226

Answers & Solutions

SECTION-I (TOPIC WISE PROBLEMS)

S.No.	Topic	Page No.
1.	STRAIGHT LINE	227 - 237
2.	CIRCLE	238 - 250
3.	PARABOLA	251 - 263
4.	ELLIPSE	264 - 277
5.	HYPERBOLA	278 - 292
6.	FUNCTION	293 - 307
7.	LIMIT OF FUNCTION	308 - 316
8.	CONTINUITY & DERIVABILITY	317 - 327
9.	METHOD OF DIFFERENTIATION	328 - 334
10.	APPLICATION OF DERIVATIVES	335 - 355
11.	INDEFINITE INTEGRAL	356 - 363
12.	DEFINITE INTEGRAL	364 - 378
13.	AREA UNDER CURVE	379 - 385
14.	DIFFERENTIAL EQUATION	386 - 397
15.	BASICS	398 - 405
16.	QUADRATIC EQUATION	406 - 418
17.	SEQUENCE & SERIES	419 - 428
18.	BINOMIAL THEOREM	429 - 436
19.	PERMUTATION & COMBINATION	437 - 443
20.	PROBABILITY	444 - 455
21.	MATRICES & DETERMINANTS	456 - 464
22.	COMPLEX NUMBER	465 - 474
23.	VECTORS	475 - 485
24.	THREE DIMENSIONAL GEOMETRY	486 - 493
25.	TRIGONOMETRIC IDENTITIES & EQUATION	494 - 503
26.	SOLUTION OF TRIANGLES & HEIGHT DISTANCE	504 - 515
27.	INVERSE TRIGONOMETRIC FUNCTION	516 - 524

Answers & Solutions

SECTION-II (PRACTICE TEST PAPERS)

Particular	Page No.
6 PTs (PART SYLLABUS TEST)	
PT-01 (COORDINATE GEOMETRY & 2-D _CLASS XI)	525 - 535
PT-02 (ALGEBRA-1_CLASS XI)	536 - 543
PT-03 (TRIGONOMETRY_CLASS XI)	544 - 554
PT-04 (DIFFERENTIAL CALCULUS_CLASS XII)	555 - 562
PT-05 (INTEGRAL CALCULUS_CLASS XII)	563 - 572
PT-06 (ALGEBRA-2 & GEOMETRY-3-D_CLASS XII)	573 - 580
3 FST (FULL SYLLABUS SUBJECT TEST)	
FST-01 (XI SYLLABUS)	581 - 586
FST-02 (XII SYLLABUS)	587 - 591
FST-03 (XI + XII SYLLABUS)	592 - 604

SECTION-I
TOPIC WISE PROBLEMS

TOPIC 1 STRAIGHT LINE

SECTION - I : STRAIGHT OBJECTIVE TYPE

1.1. Let O be the origin, A(1, 0) and B(0, 1) and P(x, y) are points such that $xy > 0$ and $x + y < 1$, then :
(A) P lies inside triangle OAB or in the third quadrant
(B) P lies inside triangle OAB or in the first quadrant
(C) P must lie inside the triangle OAB
(D) P lies in the first quadrant only

1.2 Given the family of lines, $a(3x + 4y + 6) + b(x + y + 2) = 0$. The line of the family situated at the greatest distance from the point P (2, 3) has equation :
(A) $4x + 3y + 8 = 0$ (B) $5x + 3y + 10 = 0$ (C) $15x + 8y + 30 = 0$ (D) None

1.3 If two vertices of a triangle are (–2 ,3) and (5 , –1) , orthocentre lies at the origin and centroid on the line $x + y = 7$, then the third vertex is :
(A) (7, 4) (B) (8, 14) (C) (12, 21) (D) None of these

1.4 OPQR is a square and M, N are the mid points of the sides PQ and QR respectively. If the ratio of the areas of the square and the triangle OMN is $\lambda : 6$, then $\frac{\lambda}{4}$ is equal to :
(A) 2 (B) 4 (C) 12 (D) 16

1.5 P is point on either of the two lines $y - \sqrt{3}|x| = 2$ at a distance of 5 units from their point of intersection. The co-ordinates of the foot of the perpendicular from P on the bisector of the angle between them are :
(A) $\left(0, \frac{4+5\sqrt{3}}{2}\right)$ or $\left(0, \frac{4-5\sqrt{3}}{2}\right)$ depending on which the points p is taken
(B) $\left(0, \frac{4+5\sqrt{3}}{2}\right)$ (C) $\left(0, \frac{4-5\sqrt{3}}{2}\right)$ (D) $\left(\frac{5}{2}, \frac{5\sqrt{3}}{2}\right)$

1.6 A pair of perpendicular straight lines drawn through the origin form an isosceles triangle with line $2x + 3y = 6$, then area of the triangle so formed is
(A) $\frac{36}{13}$ (B) $\frac{12}{17}$ (C) $\frac{13}{5}$ (D) $\frac{17}{13}$

1.7 Let ABC be a triangle. Let A be the point (1, 2), $y = x$ is the perpendicular bisector of AB and $x - 2y + 1 = 0$ is the angle bisector of $\angle C$. If equation of BC is given by $ax + by - 5 = 0$, then the value of $a + b$ is
(A) 1 (B) 2 (C) 3 (D) 4

1.8 The distance of the line $2x - 3y = 4$ from the point (1, 1) in the direction of the line $x + y = 1$ is
(A) $\sqrt{2}$ (B) $5\sqrt{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) None of these

1.9 If A(2, 1), B(8, 1), C(4, 3) and D(6, 6), then the area of the quadrilateral ABDC is
(A) 14 units (B) 7 units (C) 28 units (D) None of these

1.10 The image of P(a, b) in the line y = – x is Q and the image of Q in the line y = x is R, then the mid-point of PR is

(A) (a + b, b + a) (B) $\left(\frac{a+b}{2}, \frac{b+a}{2}\right)$ (C) (a – b, b – a) (D) (0, 0)

1.11 If in triangle ABC, A ≡ (1, 10), circumcentre ≡ $\left(-\frac{1}{3}, \frac{2}{3}\right)$ and orthocentre ≡ $\left(\frac{11}{3}, \frac{4}{3}\right)$ then the co-ordinates of mid-point of side opposite to A is

(A) $\left(1, -\frac{11}{3}\right)$ (B) (1, 5) (C) (1, –3) (D) (1, 6)

1.12 A rectangle ABCD has its side AB parallel to the line y = x and vertices A, B and D lie on y = 1, x = 2 and x = – 2 respectively. Locus of vertex C is

(A) x – y = 5 (B) x = 5 (C) x + y = 5 (D) y = 5

1.13 The sides of a rectangle are x = 0, y = 0, x = 4 and y = 3. The equation of the straight line having slope $\frac{1}{2}$ that divides the rectangle in to two equal halves, is

(A) 2x + y = 1 (B) 2x = y + 1 (C) 2y = x + 1 (D) 2y + x = 1

1.14 Consider the point A(3, 4), B(7, 13). If 'P' be a point on the line y = x such that PA + PB is minimum, then coordinates of 'P' is

(A) $\left(\frac{13}{7}, \frac{13}{7}\right)$ (B) $\left(\frac{23}{7}, \frac{23}{7}\right)$ (C) $\left(\frac{31}{7}, \frac{31}{7}\right)$ (D) $\left(\frac{33}{7}, \frac{33}{7}\right)$

1.15 A variable line is drawn through O to cut two fixed straight lines L_1 and L_2 in R and S. A point P is chosen on the variable line such that $\frac{m+n}{OP} = \frac{m}{OR} + \frac{n}{OS}$. Find the locus of P which is a straight line passing through the point of intersection of L_1 and L_2.

(A) cn (ax + by – 1) + m(y – c) = 0 (B) n (ax + by – 1) + m(y – c) = 0
(C) cn (ax + by – 1) + (y – c) = 0 (D) n (ax + by – 1) + (y – c) = 0

1.16 Chords of the curve $4x^2 + y^2 - x + 4y = 0$ which subtend a right angle at the origin pass through a fixed point whose co-ordinates are :

(A) $\left(-\frac{1}{5}, \frac{4}{5}\right)$ (B) $\left(\frac{1}{5}, \frac{-4}{5}\right)$ (C) $\left(\frac{1}{5}, \frac{4}{5}\right)$ (D) $\left(\frac{-1}{5}, \frac{-4}{5}\right)$

1.17 Which of the following statement(s) is/are correct ?

S1 : The new co-ordinates of a point (4, 5), when the origin is shifted to the point (1, –2) are (3, 7).
S2 : Locus of a point whose distance from (a, 0) is equal to its distance from y-axis, is $y^2 - 2ax + a^2 = 0$.
S3 : If the point (a, a) is placed in between the lines |x + y| = 4, then |a| = 2.
S4 : If A(2, 2) , B(–4, –4), C(5, –8) are vertices of any triangle, then the length of median pass through C is $\sqrt{85}$.

(A) TFFT (B) TFFF (C) TTFT (D) TTTF

1.18 Which of the following statement(s) is/are correct ?

S1 : The lines $x + (\log_a b)y + (\log_a c) = 0$, $(\log_b a)x + y + (\log_b c) = 0$ and $(\log_c a)x + (\log_c b)y + 1 = 0$ are concurrent.
S2 : Equation of a straight line passing through the origin and making with positive x – axis an angle twice the size of the angle made by the line y = 0.2 x with the positive x – axis, is y = 0.4 x
S3 : Area of the triangle formed by the lines $y^2 - 9xy + 18x^2 = 0$ and y = 9 is $\frac{27}{4}$ sq. units.
S4 : Lines through the origin and perpendicular to the lines $xy - 3y^2 + y - 2x + 10 = 0$ is $3y^2 + xy = 0$

(A) FTTF (B) TFTF (C) TTFF (D) FFTT

1.19 Consider the following statements :

S_1 : The image of the point (2, 1) with respect to the line x + 1 = 0 is (–2, 1).

S_2 : If (ℓ, m) is a point on the line x + y = 4 which lie at a unit distance from the line 4x + 3y = 10, then $\frac{\ell+m}{2}$ is a prime number.

S_3 : Orthocentre of the triangle with vertices (10, 20), (22, 25) and (10, 25) is (10, 25).

S_4 : The line y = mx bisect the angle between the lines $ax^2 - 2hxy + by^2 = 0$ if $h(1 - m^2) + m(a - b) = 0$

State, in order, whether S_1, S_2, S_3, S_4 are true or false

(A) FTTF (B) FFTT (C) TTFF (D) FTTT

SECTION - II : MULTIPLE CORRECT ANSWER TYPE

1.20 If $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ are the vertices of a triangle then the equation

$$\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} + \begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0 \text{ represents}$$

(A) Median through A (B) Altitude through A (C) Angle bisector of A (D) bisector of BC

1.21 Straight lines $(x + 7y)^2 + 4\sqrt{2}(x + 7y) - 42 = 0$ then

(A) distance between them 2
(B) distance between them 3
(C) angle between them 0°
(D) angle between them 90°

1.22 If point (a , a) lies in between the lines |x + y| = 6, then 'a' may satisfy ([.] denotes G.I.F.)

(A) $[a] = [\pi]$ (B) $[a] = [e]$ (C) $[a] = [-e] \in (4, \infty)$ (D) $[a] = \left[\frac{22}{7}\right]$

1.23 Straight line equation of the diagonals of the square formed by the pairs of lines xy + 4x – 3y – 12 = 0 and xy – 3x + 4y – 12 = 0 is :

(A) $x^2 - y^2 + x - y = 0$
(B) x – y = 0 ; x + y + 1 = 0
(C) $x^2 + 2xy + y^2 + x + y = 0$
(D) $x^2 - 2xy + y^2 + x - y = 0$

1.24 The sides of a triangle are the straight lines x + y = 1 ; 7y = x and $\sqrt{3}y + x = 0$. Then which of the following is an interior point of the triangle ?

(A) circumcentre (B) centroid (C) incentre (D) orthocentre

1.25 If one diagonal of a square is the portion of the line $\frac{x}{a} + \frac{y}{b} = 1$ intercepted by the axes, then the extremities of the other diagonal of the square are

(A) $\left(\frac{a+b}{2}, \frac{a+b}{2}\right)$ (B) $\left(\frac{a-b}{2}, \frac{a+b}{2}\right)$ (C) $\left(\frac{a-b}{2}, \frac{b-a}{2}\right)$ (D) $\left(\frac{a+b}{2}, \frac{b-a}{2}\right)$

1.26 Two straight lines u = 0 and v = 0 passes through the origin and angle between them is $\tan^{-1}(7/9)$. If the ratio of the slope of v = 0 and u = 0 is 9/2, then their equations are

(A) y = 3x & 3y = 2x
(B) 2y = 3x & 3y = x
(C) y + 3x = 0 & 3y + 2x = 0
(D) 2y + 3x = 0 & 3y + x = 0

1.27 A and B are two fixed points whose co-ordinates are (3, 2) and (5, 4) respectively. The co-ordinates of a point P if ABP is an equilateral triangle, are

(A) $\left(4-\sqrt{3}, 3+\sqrt{3}\right)$ (B) $\left(4+\sqrt{3}, 3-\sqrt{3}\right)$ (C) $\left(3-\sqrt{3}, 4+\sqrt{3}\right)$ (D) $\left(3+\sqrt{3}, 4-\sqrt{3}\right)$

1.28 The points A (0 , 0), B (cos α , sin α) and C (cos β, sin β) are the vertices of a right angled triangle if

(A) $\sin\frac{\alpha-\beta}{2}=\frac{1}{\sqrt{2}}$ (B) $\cos\frac{\alpha-\beta}{2}=-\frac{1}{\sqrt{2}}$ (C) $\cos\frac{\alpha-\beta}{2}=\frac{1}{\sqrt{2}}$ (D) $\sin\frac{\alpha-\beta}{2}=-\frac{1}{\sqrt{2}}$

1.29 If $x-2y+4=0$ and $2x+y-5=0$ are the sides of an isosceles triangle having area 10 sq. units, then equation of third side is

(A) $x+3y+10=0$ (B) $3x-y+9=0$ (C) $x+3y-19=0$ (D) $3x-y-11=0$

SECTION - III : ASSERTION AND REASON TYPE

1.30 **Statement - 1 :** The internal angle bisector of angle C of a triangle ABC with sides AB, AC and BC are $y=0$, $3x+2y=0$ and $2x+3y+6=0$ respectively, is $5x+5y+6=0$.
Statement - 2 : Image of point A with respect to $5x+5y+6=0$ lies on side BC of the triangle.
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

1.31 **Statement - 1 :** Let the lines $2x+3y+19=0$ and $9x+6y-17=0$ cut the x axis in A, B and y axis in C, D respectively, then points A,B, C, D are concyclic.
Statement - 2 : Since OA . OB = OC . OD, where O is origin therefore A, B, C, D points are concyclic
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

1.32 **Statement - 1 :** Perpendicular from point A (1, 1) to the line joining the points B (c cos α, c sin α) and C (c cos β, c sin β) bisects BC for all values of α and β.
Statement - 2 : Perpendicular drawn from the vertex to the base of an isosceles triangle bisects the base.
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

1.33 **Statement - 1 :** Let the vertices of a ΔABC are A(–5, –2), B(7, 6) and C(5, –4), then co-ordinates of circumcentre is (1, 2).
Statement - 2 : In a right angle triangle, mid-point of hypotenuous is the circumcentre of the triangle.
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

1.34 **Statement - 1 :** If $-2h=a+b$, then one line of the pair of lines $ax^2+2hxy+by^2=0$ bisects the angle between co-ordinate axes in positive quadrant.
Statement - 2 : If $ax+y(2h+a)=0$ is a factor of $ax^2+2hxy+by^2=0$, then $b+2h+a=0$.
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

1.35 **Statement - 1 :** Two of the straight lines represented by the equation $ax^3+bx^2y+cxy^2+dy^3=0$ will be right angled if $a^2+ac+bc+d^2=0$.
Statement - 2 : Product of the slopes of two perpendicular lines is – 1.
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

SECTION - IV : COMPREHENSION TYPE

Comprehension # 1

Let $P(x_1, y_1)$ be a point not lying on the line ℓ : ax + by + c = 0. Let L be a point on line ℓ such that PL is perpendicular to the line ℓ.
Let Q(x, y) be a point on the line passing through P and L. Let absolute distance between P and Q is n times ($n \in R^+$) the absolute distance between P and L. If L and Q lie on the same side of P, then coordinates of Q are given by the formula $\frac{x-x_1}{a} = \frac{y-y_1}{b} = -n\frac{ax_1+by_1+c}{a^2+b^2}$ and if L and Q lie on the opposite sides of P, then the coordinates of Q are given by the formula $\frac{x-x_1}{a} = \frac{y-y_1}{b} = n\frac{ax_1+by_1+c}{a^2+b^2}$

Read the above passage carefully and answer the following questions :

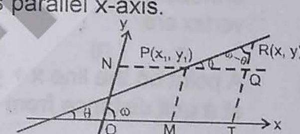
1.36 Let (2, 3) be the point P and 3x – 4y + 1 = 0 be the straight line ℓ, if the sum of the coordinates of a point Q lying on PL, where L and Q lie on the same side of P and n = 15 is α, then α =
(A) 0 (B) 1 (C) 2 (D) 3

1.37 Let (1, 1) be the point P and – 5x + 12y + 6 = 0 be the straight line ℓ, if the sum of the coordinates of a point Q lying on PL, where L and Q are on opposite sides of P and n = 13α is β, then β =
(α is as obtained in the above question)
(A) –9 (B) 25 (C) 12 (D) 16

1.38 Let (2, –1) be the point P and x – y + 1 = 0 be the straight line ℓ, if a point Q lies on PL where L and Q are on the same side of P for which n = β, then the coordinates of the image Q′ of the point Q in the line ℓ are
(β is as obtained in the above question)
(A) (14, 28) (B) (30, –29) (C) (26, –27) (D) (–26, 27)

Comprehension # 2

Let us consider the situation when axes are inclined at an angle 'ω'. If coordinates of a point P are (x_1, y_1) then $PN = x_1$, $PM = y_1$. Where PM is parallel to y-axis and PN is parallel x-axis.



Now $RQ = y - y_1$, $PQ = x - x_1$
From ΔPQR, we have

$$\frac{PQ}{\sin(\omega-\theta)} = \frac{RQ}{\sin\theta}$$

∴ Equation of straight line through P and makes an angle θ with x-axis is

$y - y_1 = \frac{\sin\theta}{\sin(\omega-\theta)}(x - x_1)$ written in the form of

$y - y_1 = m(x - x_1)$ where $m = \frac{\sin\theta}{\sin(\omega-\theta)}$. (m is called of slope of line)

∴ Angle of inclination of line with x-axis is given by $\tan\theta = \left(\frac{m\sin\omega}{1+m\cos\omega}\right)$

Read the above comprehension and answer the following questions.

1.39 The axes being inclined at an angle of 60°, then the inclination of the straight line y = 2x + 5 with the axis of x is

(A) 30° (B) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (C) $\tan^{-1}2$ (D) 60°

1.40 The axes being inclined at an angle of 60°, then angle between the two straight lines y = 2x + 5 and 2y + x + 7 = 0 is

(A) 90° (B) $\tan^{-1}\left(\frac{5}{3}\right)$ (C) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (D) $\tan^{-1}\left(\frac{5}{\sqrt{3}}\right)$

1.41 The axes being inclined at an angle of 30°, then equation of straight line which makes an angle of 60° with the positive direction of x-axis and x-intercept equal to 2, is

(A) $y - \sqrt{3}x = 0$ (B) $\sqrt{3}y = x$ (C) $y + \sqrt{3}x = 2\sqrt{3}$ (D) $y + 2x = 0$

Comprehension # 3

A(1, 3) and $C\left(-\frac{2}{5}, -\frac{2}{5}\right)$ are the vertices of a triangle ABC and the equation of the angle bisector of ∠ABC is x + y = 2.

Answer the following questions.

1.42 Equation of side BC is

(A) 7x + 3y – 4 = 0 (B) 7x + 3y + 4 = 0 (C) 7x – 3y + 4 = 0 (D) 7x – 3y – 4 = 0

1.42 Coordinates of vertex B are

(A) $\left(\frac{3}{10}, \frac{17}{10}\right)$ (B) $\left(\frac{17}{10}, \frac{3}{10}\right)$ (C) $\left(-\frac{5}{2}, \frac{9}{2}\right)$ (D) (1, 1)

1.44 Equation of side AB is

(A) 3x + 7y = 24 (B) 3x + 7y + 24 = 0 (C) 13x + 7y + 8 = 0 (D) 13x – 7y + 8 = 0

SECTION - V : MATRIX - MATCH TYPE

1.45

Column - I		Column - II	
(A)	Two vertices of a triangle are (5, – 1) and (– 2, 3). If orthocentre is the origin, then coordinates of the third vertex are	(p)	(– 4, – 7)
(B)	A point on the line x + y = 4 which lies at a unit distance from the line 4x + 3y = 10, is	(q)	(– 7, 11)
(C)	Orthocentre of the triangle made by the lines x + y – 1 = 0, x – y + 3 = 0, 2x + y = 7 is	(r)	(1, –2)
(D)	If a, b, c are in A.P., then lines ax + by = c are concurrent at	(s)	(–1, 2)
		(t)	(4, –7)

1.46 **Match the following :**

Column – I		Column – II	
(A)	Lines x – 2y – 6 = 0, 3x + y – 4 = 0 and $\lambda x + 4y + \lambda^2 = 0$ are concurrent , then value of λ is	(p)	2
(B)	The points (λ + 1, 1), (2λ + 1, 3) and (2λ + 2, 2λ) are collinear, then the value of λ is	(q)	4
(C)	If line x + y – 1– λ = 0, passing through the intersection of x – y + 1 = 0 and 3x + y – 5 = 0 is perpendicular to one of them, then the vlaue of λ is	(r)	– 1/2
(D)	If line y – x – 1 + λ = 0 is equally inclined to axes and equidistant from the points (1, –2) and (3, 4), then λ is	(s)	– 4
		(t)	3

gle of 60° with

ctor of $\angle ABC$

0

= 0

II

1.47 Match the following

Column - I		Column - II	
(A)	The number of integral values of 'a' for which the point $P(a, a^2)$ lies completely inside the triangle formed by the lines $x = 0$, $y = 0$ and $x + 2y = 3$	(p)	1
(B)	Triangle ABC with AB = 13, BC = 5 and AC = 12 slides on the coordinate axis with A and B on the positive x-axis and positive y-axis respectively, the locus of vertex C is a line $12x - ky = 0$, then the value of k is	(q)	4
(C)	The reflection of the point $(t - 1, 2t + 2)$ in a line is $(2t + 1, t)$, then the line has slope equals to	(r)	3
(D)	In a triangle ABC the bisector of angles B and C lie along the lines $x = y$ and $y = 0$. If A is (1, 2) then $\sqrt{10}$ d(A,BC) where d(A, BC) represents distance of point A from side BC	(s)	5
		(t)	0

1.48 Match the column

Column - I		Column - I	
(A)	Area of the region enclosed by $2\|x\| + 3\|y\| \le 6$ is	(p)	12
(B)	The extrimities of the base of an isosceles triangle ABC are the points A(2, 0) and B(0, 1). If the equation of the side AC is $x = 2$ and 'm' be the slope of side BC, then '4m' equals to	(q)	4
(C)	Area of ΔABC is 20 sq. units where points A, B and C are (4, 6), (10, 14) and (x, y) respectively. If AC is perpendicular to BC, then number of positions of C is	(r)	5
(D)	In a ΔABC co-ordinates of orthocentre, centroid and vertex A are respectively (2, 2), (2, 1) and (0, 2). Then x-coordinate of vertex B is	(s)	3
		(t)	2

SECTION - VI : INTEGER TYPE

1.49. The vertices B and C of a triangle ABC lie on the lines $3y = 4x$ and $y = 0$ respectively and the side BC passes through the point $\left(\frac{2}{3}, \frac{2}{3}\right)$. If ABOC is a rhombus, O being the origin. If co-ordinates of vertex A is (α, β), then find the value of $\frac{5}{2}(\alpha + \beta)$.

1.50 The equations of two adjacent sides of a rhombus formed in first quadrant are represented by $7x^2 - 8xy + y^2 = 0$, then slope of its longer diagonal is :

TOPIC 2 — CIRCLE

SECTION - I : STRAIGHT OBJECTIVE TYPE

2.1 If r_1 and r_2 are the radii of smallest and largest circles which passes through (5, 6) and touches the circle $(x-2)^2 + y^2 = 4$, then $r_1 r_2$ is

(A) $\frac{4}{41}$ (B) $\frac{41}{4}$ (C) $\frac{5}{41}$ (D) $\frac{41}{6}$

2.2 Minimum radius of circle which is orthogonal with both the circles $x^2 + y^2 - 12x + 35 = 0$ and $x^2 + y^2 + 4x + 3 = 0$ is

(A) 4 (B) 3 (C) $\sqrt{15}$ (D) 1

2.3 S(x, y) = 0 represents a circle. The equation S(x, 2) = 0 gives two identical solutions x = 1 and the equation S(1, y) = 0 gives two distinct solutions y = 0, 2. Find the equation of the circle.

(A) $x^2 + y^2 + 2x - 2y + 1 = 0$ (B) $x^2 + y^2 - 2x + 2y + 1 = 0$
(C) $x^2 + y^2 - 2x - 2y - 1 = 0$ (D) $x^2 + y^2 - 2x - 2y + 1 = 0$

2.4 From a point R(5, 8) two tangents RP and RQ are drawn to a given circle S = 0 whose radius is 5. If circumcentre of the triangle PQR is (2, 3), then the equation of circle S = 0 is

(A) $x^2 + y^2 + 2x + 4y - 20 = 0$ (B) $x^2 + y^2 + x + 2y - 10 = 0$
(C) $x^2 + y^2 - x - 2y - 20 = 0$ (D) $x^2 + y^2 - 4x - 6y - 12 = 0$

2.5 Consider a family of circles passing through two fixed points A (3,7) & B(6,5). Find the point of concurrency of the chords in which the circle $x^2 + y^2 - 4x - 6y - 3 = 0$ cuts the members of the family :

(A) $\left(\frac{11}{17}, \frac{3}{7}\right)$ (B) $\left(2, \frac{23}{3}\right)$ (C) (–4 , 3) (D) chords are not concurrent

2.6 If the tangents are drawn from any point on the line x + y = 3 to the circle $x^2 + y^2 = 9$, then the chord of contact passes through the point

(A) (3, 5) (B) (3, 3) (C) (5, 3) (D) none of these

2.7 The triangle PQR is inscribed in the circle $x^2 + y^2 = 25$ such that P lies on the major arc QR. If Q and R have coordinates (3, 4) and (–4, 3) respectively, then $\angle QPR$ is equal to

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

2.8 Equation of chord of the circle $x^2 + y^2 - 3x - 4y - 4 = 0$, which passes through the origin such that origin divides it in the ratio 4 : 1, is

(A) x = 0 (B) 24x + 7y = 0 (C) 7x + 24y = 0 (D) 7x – 24y = 0

2.9 If the radius of the circumcircle of the triangle TPQ, where PQ is chord of contact corresponding to point T with respect to circle $x^2 + y^2 - 2x + 4y - 11 = 0$, is 6 units, then minimum distance of T from the director circle of the given circle is:

(A) 6 (B) 12 (C) $6\sqrt{2}$ (D) $12 - 4\sqrt{2}$

2.10 P is a point (a, b) in the first quadrant. If the two circles which pass through P and touch both the co–ordinate axes cut at right angles, then

(A) $a^2 - 6ab + b^2 = 0$ (B) $a^2 + 2ab - b^2 = 0$ (C) $a^2 - 4ab + b^2 = 0$ (D) $a^2 - 8ab + b^2 = 0$

2.11 The exhaustive range of values of 'a' such that the angle between the pair of tangents drawn from (a, a) to the circle $x^2 + y^2 - 2x - 2y - 6 = 0$ lies in the range $\left(\frac{\pi}{3}, \pi\right)$, is

(A) $(1, \infty)$ (B) $(-5, -3) \cup (3, 5)$

(C) $(-\infty, -2\sqrt{2}) \cup (2\sqrt{2}, \infty)$ (D) $(-3, -1) \cup (3, 5)$

2.12 In triangle ABC equation of side BC is $x - y = 0$ circumcentre and orthocentre of the triangle are (2,3) and (5,8) respectively. Equation of circumcircle of the triangle is

(A) $x^2 + y^2 - 4x + 6y - 27 = 0$ (B) $x^2 + y^2 - 4x - 6y - 27 = 0$

(C) $x^2 + y^2 + 4x + 6y - 27 = 0$ (D) $x^2 + y^2 + 4x - 6y - 27 = 0$

2.13. A circle touches the lines $y = \frac{x}{\sqrt{3}}$, $y = x\sqrt{3}$ and has unit radius. If the centre of this circle lies in the first quadrant, then one possible equation of this circle is -

(A) $x^2 + y^2 - 2x(\sqrt{3} + 1) - 2y(\sqrt{3} + 1) + 8 + 4\sqrt{3} = 0$

(B) $x^2 + y^2 - 2x(\sqrt{3} + 1) - 2y(\sqrt{3} + 1) + 5 + 4\sqrt{3} = 0$

(C) $x^2 + y^2 - 2x(\sqrt{3} + 1) - 2y(\sqrt{3} + 1) + 7 + 4\sqrt{3} = 0$

(D) $x^2 + y^2 - 2x(\sqrt{3} + 1) - 2y(\sqrt{3} + 1) + 6 + 4\sqrt{3} = 0$

2.14 Equation of the straight line, which meets the circle $x^2 + y^2 = 100$ in two points, each point at a distance of 4 unit from the point (8,6), is -

(A) $4x + 3y - 50 = 0$ (B) $4x + 3y - 100 = 0$ (C) $4x + 3y - 46 = 0$ (D) none of these

2.15 A light ray gets reflected from the line $x = -2$. If the reflected ray touches the circle $x^2 + y^2 = 4$ and point of incident is $(-2, -4)$, then equation of incident ray is

(A) $3x + 4y + 22 = 0$ (B) $4x + 3y + 20 = 0$ (C) $x + 2y + 10 = 0$ (D) $x + y + 6 = 0$

2.16 **S1 :** The locus of the centre of a circle which cuts a given circle orthogonally and also touches a given straight line is a parabola.

S2 : Two circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ touches iff $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$.

S3 : The two circles which passes through (0, a) and (0, –a) and touch the straight line $y = mx + c$, will cut orthogonally if $c^2 = a^2(2 + m^2)$.

S4 : The length of the common chord of the circles $(x - a)^2 + y^2 = a^2$ and $x^2 + (y - b)^2 = b^2$ is $\frac{ab}{\sqrt{a^2 - b^2}}$.

(A) TFTF (B) TTFF (C) TFTT (D) FFTT

2.17 **S1 :** If the length of tangent drawn from an external point P to the circle of radius r is ℓ, then area of triangle formed by pair of tangents and its chord of contact is $\frac{r\ell^3}{r^2 + \ell^2}$.

S2 : If the points where the lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ meet the co-ordinate axes are concyclic, then $a_1c_1 = a_2c_2$

S3 : A circle is inscribed in an equilateral triangle of side a, the area of any square inscribed in the circle is $\frac{a^2}{8}$

S4 : The equation of the circle with origin as centre passing the vertices of an equilateral triangle whose median is of length 3a is $x^2 + y^2 = 4a^2$

(A) F F T T (B) T T T F (C) T F F T (D) T T T T

2.18 S_1 : If the point (0, g) lies inside the circle $x^2 + y^2 + 2gx + c = 0$, then c cannot be positive.

S_2 : Length of tangent from origin to the circle $4x^2 + 4y^2 + 8x + 8y + 1 = 0$ is $\frac{1}{2}$.

S_3 : The equation $2x^2 + 3y^2 - 8x - 18y + 35 = k$ represents a point if k = 0.

S_4 : The point $(\lambda, 1 + \lambda)$ lies inside the circle $x^2 + y^2 = 1$ if $\lambda = -\frac{1}{2}$.

(A) F F T T (B) T T T F (C) T F F F (D) T T T T

SECTION - II : MULTIPLE CORRECT ANSWER TYPE

2.19 A circle passes through the points (-1,0) (0,6) (5,5). Then the points on the circle the tangent at which are parallel to the straight line joining origin to the centre.

(A) (5,1) (B) (2,3) (C) (-1,5) (D) (-3,2)

2.20 Real numbers x, y satisfies $x^2 + y^2 = 1$,

M & m are maximum and minimum value of the expression $z = \frac{4-y}{7-x}$ then values of $2M \pm 6m$ are

(A) 4 (B) 3 (C) 6 (D) –1

2.21 The integral values of 'a' for which the variable line y = 2x + a lies between the circles $x^2 + y^2 - 2x - 2y + 1 = 0$ and $x^2 + y^2 - 16x - 2y + 61 = 0$ without intersecting or touching either circle are

(A) – 8 (B) – 9 (C) 8 (D) 9

2.22 Equation of chord AB of circle $x^2 + y^2 = 2$ passing through the point P(2, 2) such that $\frac{PB}{PA} = 3$ is

(A) x = 3y (B) x = y (C) $y - 2 = \sqrt{3}(x - 2)$ (D) $y - 2 = 1\ (x - 2)$

2.23 Two circles have equations $x^2 + y^2 - 4x - 6y - 7 = 0$ and $x^2 + y^2 - 2x - 3 = 0$ then

(A) they cut each other
(B) Number of common tangents are 2
(C) one circle lies inside the other
(D) one circle lies completely outside the other

2.24 The possible of values of $\lambda (\lambda > 0)$ such that the angle between the pair of tangents from point $(\lambda, 0)$ to the circle $x^2 + y^2 = 4$ lies in interval $\left(\frac{\pi}{2}, \frac{2\pi}{3}\right)$ is

(A) $\left(\frac{4}{\sqrt{3}}, 2\sqrt{2}\right)$ (B) $\left(0, \sqrt{2}\right)$ (C) (1, 2) (D) $\left(\frac{4\sqrt{3}}{3}, \frac{4}{\sqrt{3}}\right)$

2.25 Consider the circle $x^2 + y^2 - 10x - 6y + 30 = 0$. Let O be the centre of the circle and tangent at A(7, 3) and B(5, 1) meet at C. Let S = 0 represents family of circles passing through A and B, then -

(A) area of quadrilateral OACB = 4
(B) the radical axis for the family of circles S = 0 is x + y = 10
(C) the smallest possible circle of the family S = 0 is $x^2 + y^2 - 12x - 4y + 38 = 0$
(D) the coordinates of point C are (7, 1)

2.26 Let x, y be real variable satisfying the $x^2 + y^2 + 8x - 10y - 40 = 0$. Let a = max $\{(x + 2)^2 + (y - 3)^2\}$ and b = min $\{(x + 2)^2 + (y - 3)^2\}$, then

(A) a + b = 18 (B) $a + b = 4\sqrt{2}$ (C) $a - b = 4\sqrt{2}$ (D) a. b = 73

2.27 Coordinates of the centre of a circle, whose radius is 2 unit and which touches the line pair $x^2 - y^2 - 2x + 1 = 0$, are

(A) (4, 0) (B) $(1+2\sqrt{2}, 0)$ (C) (4, 1) (D) $(1, 2\sqrt{2})$

2.28 Point M moved on the circle $(x-4)^2+(y-8)^2=20$. Then it broke away from it and moving along a tangent to the circle, cuts the x–axis at the point $(-2, 0)$. The co–ordinates of a point on the circle at which the moving point broke away is

(A) $\left(-\frac{3}{5}, \frac{46}{5}\right)$ (B) $\left(-\frac{2}{5}, \frac{44}{5}\right)$ (C) (6, 4) (D) (3, 5)

2.29 If the area of the quadrilateral formed by the tangents from the origin to the circle $x^2+y^2+6x-10y+c=0$ and the radii corresponding to the points of contact is 15, then values of c is/are

(A) 9 (B) 4 (C) 5 (D) 25

SECTION - III : ASSERTION AND REASON TYPE

2.30 **Statement-1 :** Number of common tangents of $x^2+y^2-2x-4y-95=0$ and $x^2+y^2-6x-8y+16=0$ is zero.

Statement-2 : If $C_1C_2 < |r_1 - r_2|$, then there will be no common tangent . (where C_1, C_2 are the centre and r_1 , r_2 are radii of circles)

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

2.31 **Statement-1 :** Let $S_1 : x^2+y^2-10x-12y-39=0$
$S_2 : x^2+y^2-2x-4y+1=0$
and $S_3 : 2x^2+2y^2-20x-24y+78=0$
The radical centre of these circles taken pairwise is $(-2, -3)$

Statement-2 : Point of intersection of three radical axis of three circles taken in pairs is known as radical centre

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

2.32 **Statement-1 :** The equations of the straight lines joining origin to the points of intersection of $x^2+y^2-4x-2y=4$ and $x^2+y^2-2x-4y-4=0$ is $(y-x)^2=0$

Statement-2 : $y+x=0$ is a common chord of $x^2+y^2-4x-2y=4$ and $x^2+y^2-2x-4y-4=0$

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

2.33 **Statement-1 :** Two orthogonal circles intersect to generate a common chord which subtends complimentary angles at their circumferences.

Statement-2 : Two orthogonal circles intersect to generate a common chord which subtends supplementary angle at their centres

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

2.34 **Statement-1** : For two non-intersecting circles, direct common tangents subtends a right angle at either of point of intersection of circles with line segment joining the centres of circles.

Statement-2 : If distance between the centres is more than sum of radii, then circles are non-intersecting

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

SECTION - IV : COMPREHENSION TYPE

Comprehension # 1

Let α-chord of a circle be that chord of the circle which subtends an angle α at the centre.

2.35 If $x + y = 1$ is α-chord of $x^2 + y^2 = 1$, then α is equal to -

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{6}$ (D) $x + y = 1$ is not a chord

2.36 If slope of a $\frac{\pi}{3}$ - chord of $x^2 + y^2 = 4$ is 1, then its equation is-

(A) $x - y + \sqrt{6} = 0$ (B) $x - y = 2\sqrt{3}$ (C) $x - y = \sqrt{3}$ (D) $x - y + \sqrt{3} = 0$

2.37 Distance of $\frac{2\pi}{3}$- chord of $x^2 + y^2 + 2x + 4y + 1 = 0$ from the centre, is -

(A) 1 (B) 2 (C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$

Comprehension # 2

A system of circles is said to be coaxial when every pair of the circles has the same radical axis. It follows from this definition that :

1. The centres of all circles of a coaxial system lie on one straight line, which is perpendicular to the common radical axis.
2. Circles passing through two fixed points form a coaxial system for which the line joining the fixed points is the common radical axis.
3. The equation to a coaxial system, of which two members are $S_1 = 0$ and $S_2 = 0$, is $S_1 + \lambda S_2 = 0$, λ is parameter. If we choose the line of centres as x-axis and the common radical axis as y - axis, then the simplest form of equation of coaxial circles is $x^2 + y^2 + 2gx + c = 0$ ...(1)

where c is fixed and g is arbitrary.

If $g = \pm\sqrt{c}$, then the radius $\sqrt{g^2 - c}$ vanishes and the circles become point circles. The points $(\pm\sqrt{c}, 0)$ are called the limiting points of the system of coaxial circles given by (1).

2.38 The equation of the circle which belongs to the coaxial system of circles for which the limiting points are $(1, -1)$, $(2, 0)$ and which passes through the origin is

(A) $x^2 + y^2 - 4x = 0$ (B) $x^2 + y^2 + 4x = 0$ (C) $x^2 + y^2 - 4y = 0$ (D) $x^2 + y^2 + 4y = 0$

2.39 If origin be a limiting point of a coaxial system one of whose member is $x^2 + y^2 - 2\alpha x - 2\beta y + c = 0$, then the other limiting point is

(A) $\left(\frac{c\alpha}{\alpha^2+\beta^2}, -\frac{c\beta}{\alpha^2+\beta^2}\right)$ (B) $\left(\frac{c\alpha}{\alpha^2+\beta^2}, \frac{c\beta}{\alpha^2+\beta^2}\right)$

(C) $\left(\frac{\alpha\beta}{\alpha^2+\beta^2}, \frac{c\alpha}{\alpha^2+\beta^2}\right)$ (D) $\left(-\frac{c\beta}{\alpha^2+\beta^2}, \frac{c\alpha}{\alpha^2+\beta^2}\right)$

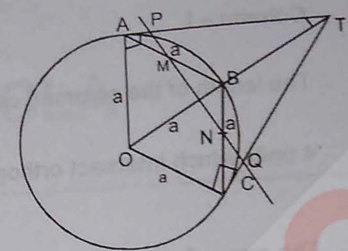
2.40 The equation of the radical axis of the system of coaxial circles $x^2 + y^2 + 2ax + 2by + c + 2\lambda(ax - by + 1) = 0$ is-

(A) $ax - by + 1 = 0$ (B) $bx + ay - 1 = 0$

(C) $2(ax + by) + 1 = 0$ (D) $2(bx - ay) + 1 = 0$

Comprehension # 3

Two variable chords AB and BC of a circle $x^2 + y^2 = a^2$ are such that AB = BC = a, and M and N are the mid points of AB and BC respectively such that line joining MN intersect the circle at P and Q where P is closer to AB and O is the centre of the circle



Answer the following questions.

2.41 $\angle OAB$ is -
(A) 30° (B) 60° (C) 45° (D) 15°

2.42 Angle between tangents at A and C is -
(A) 90° (B) 120° (C) 60° (D) 150°

2.43 Locus of point of intersection of tangents at A and C is
(A) $x^2 + y^2 = a^2$ (B) $x^2 + y^2 = 2a^2$ (C) $x^2 + y^2 = 4a^2$ (D) $x^2 + y^2 = 8a^2$

Comprehension # 4

P is a variable point on the line L = 0. Tangents are drawn to the circle $x^2 + y^2 = 4$ from P to touch it at Q and R. The parallelogram PQSR is completed.

Answer the following questions.

2.44 If $L \equiv 2x + y - 6 = 0$, then the locus of circumcentre of ΔPQR is
(A) $2x - y = 4$ (B) $2x + y = 3$ (C) $x - 2y = 4$ (D) $x + 2y = 3$

2.45 If $P \equiv (6, 8)$, then the area of ΔQRS is -
(A) $\frac{(6)^{3/2}}{25}$ sq. units (B) $\frac{(24)^{3/2}}{25}$ sq. units (C) $\frac{48\sqrt{6}}{25}$ sq. units (D) $\frac{196\sqrt{6}}{25}$ sq. units

2.46 If $P \equiv (3, 4)$, then coordinate of S is -
(A) $\left(-\frac{46}{25}, -\frac{63}{25}\right)$ (B) $\left(-\frac{51}{25}, -\frac{68}{25}\right)$ (C) $\left(-\frac{46}{25}, -\frac{68}{25}\right)$ (D) $\left(-\frac{68}{25}, -\frac{51}{25}\right)$

SECTION - V : MATRIX - MATCH TYPE

2.47

	Column – I		Column – II
(A)	If $ax + by - 5 = 0$ is the equation of the chord of the circle $(x - 3)^2 + (y - 4)^2 = 4$, which passes through (2, 3) and at the greatest distance from the centre of the circle, then $\lvert a + b\rvert$ is equal to -	(p)	6
(B)	Let O be the origin and P be a variable point on the circle $x^2 + y^2 + 2x + 2y = 0$. If the locus of mid-point of OP is $x^2 + y^2 + 2gx + 2fy = 0$, then the value of (g + f) is equal to -	(q)	3
(C)	The x-coordinates of the centre of the smallest circle which cuts the circle $x^2 + y^2 - 2x - 4y - 4 = 0$ and $x^2 + y^2 - 10x + 12y + 52 = 0$ orthogonally, is -	(r)	2
(D)	If θ be the angle between two tangents which are drawn to the circle $x^2 + y^2 - 6\sqrt{3}x - 6y + 27 = 0$ from the origin, then $2\sqrt{3}\tan\theta$ equals to -	(s)	1
		(t)	4

2.48

Column – I	Column – II
(A) The length of the common chord of two circles of radii 3 and 4 units which intersect orthogonally is $\frac{k}{5}$, then k equals to -	(p) 1
(B) The circumference of the circle $x^2 + y^2 + 4x + 12y + p = 0$ is bisected by the circle $x^2 + y^2 - 2x + 8y - q = 0$, then p + q is equal to -	(q) 24
(C) Number of distinct chords of the circle $2x(x - \sqrt{2}) + y(2y - 1) = 0$ passing through the point $\left(\sqrt{2}, \frac{1}{2}\right)$ and are bisected by x-axis, is -	(r) 32
(D) One of the diameters of the circle circumscribing the rectangle ABCD is 4y = x + 7. If A and B are the points (–3, 4) and (5, 4) respectively, then the area of the rectangle is equal to -	(s) 2
	(t) 36

SECTION - VI : INTEGER TYPE

2.49 If $C_1 : x^2 + y^2 = (3 + 2\sqrt{2})^2$ be a circle and PA and PB are pair of tangents on C_1 where P is any point on the director circle of C_1, then the radius of smallest circle which touches C_1 externally and also the two tangents PA and PB, is -

2.50 A circle touches the hypotenuse of a right angled triangle at its middle point and passes through the middle point of shorter side. If 3 unit and 4 unit be the length of the sides and 'r' be the radius of the circle, then find the value of '3r'.

2.51 A circle with centre in the first quadrant is tangent to y = x + 10, y = x – 6 and the y-axis. Let (h, k) be the centre of the circle. If the value of $(h + k) = a + b\sqrt{a}$, where $(a, b \in Q)$, find the value of (a + b).

2.52 S is a circle having centre at (0, a) and radius b(b < a). A variable circle centred at $(\alpha, 0)$ and touching circle S, meets the X-axis at M and N. A point $P \equiv \left(0, \pm\lambda\sqrt{a^2 - b^2}\right)$ on the Y-axis, such that $\angle MPN$ is a constant for any choice of α, then find λ.